

WHAT IS CLAIMED IS:

1 1. An integrated circuit for protocol control to be
2 incorporated into an apparatus capable of handling digital
3 money defined as a symbol of electronic currency, said
4 integrated circuit being configured by integrating, on one
5 chip, a storage section for storing a control program
6 prepared for protocols for a plurality of digital money
7 different in mode from each other; a processing section for
8 controlling the handling of said plurality of digital money,
9 different in mode, by executing said control program stored
10 in said storage section; and an interface circuit connected
11 to an external circuit including at least one of an
12 external processing section and an external storage section
13 to fulfill an interface function between said external
14 circuit and said processing section.

1 2. An integrated circuit for protocol control as defined
2 in claim 1, wherein a peripheral control circuit, which
3 fulfills a control function related to processing of
4 digital money, is additionally integrated on said chip.

1 3. An integrated circuit for protocol control as defined
2 in claim 2, wherein said peripheral control circuit
3 includes a medium control circuit which operates under
4 control of said processing section and said control program
5 to control a portable type medium storing digital money.

1 4. An integrated circuit for protocol control as defined
2 in claim 2, wherein said peripheral control circuit
3 includes a communication control circuit which operates
4 under control of said processing section and said control
5 program to control a communication with an external circuit.

1 5. An integrated circuit for protocol control as defined
2 in claim 2, wherein said peripheral control circuit
3 includes a display control circuit which operates under
4 control of said processing section and said control program
5 to control an external display unit.

1 6. An integrated circuit for protocol control as defined
2 in claim 2, wherein said peripheral control circuit
3 includes an input control circuit which operates under
4 control of said processing section and said control program
5 to perform input processing of a signal from an external
6 input unit.

1 7. An integrated circuit for protocol control as defined
2 in claim 1, wherein logical cutoff is made between said
3 storage section and an external connecting terminal of said
4 integrated circuit, and said control program is stored in
5 said storage section at the time of production of said
6 integrated circuit.

1 8. An integrated circuit for protocol control as defined
2 in claim 1, further containing identification means for
3 judging whether or not a program storing external storage
4 section is connected through said interface circuit as said
5 external circuit, wherein, when said identification means
6 judges that said program storing external storage section
7 is in connection, said processing section executes a
8 program stored in said program storing external storage
9 section.

1 9. An integrated circuit for protocol control as defined
2 in claim 8, wherein said identification means reads one or
3 more logical addresses allocated to connection with said
4 program storing external storage section, and makes a
5 judgment to connection or non-connection with said program
6 storing external storage section by comparing a
7 predetermined value with a value obtained as a reading
8 result.

1 10. An integrated circuit for protocol control as defined
2 in claim 2, wherein said control program including:
3 one or more device control programs for controlling
4 one of said external circuit connected to said interface
5 circuit and said peripheral control circuit as a device;
6 a plurality of protocol control programs for
7 controlling said device control program in relation to each
8 of said plurality of digital money different in mode; and

9 an application program for controlling said device
10 control program and said protocol control programs.

1 11. An integrated circuit for protocol control as defined
2 in claim 10, wherein, when receiving a control telegraphic
3 statement including a digital money classification field
4 specifying one of said plurality of digital money different
5 in mode and a transaction classification field specifying a
6 transaction classification common to said plurality of
7 digital money different in mode, said application program
8 conducts a transaction, specified by said transaction
9 classification field, through the use of said protocol
10 control program corresponding to the digital money
11 specified by said digital money classification field.

1 12. An integrated circuit for protocol control as defined
2 in claim 11, wherein, when receiving said control
3 telegraphic statement including a device classification
4 field specifying said device control program and an
5 instruction field describing a control instruction to said
6 device control program, said application program informs
7 said device control program, specified by said device
8 classification field, of an instruction described in said
9 instruction field, and makes said device control program
10 execute said instruction, and further, transmits a response
11 to said instruction from said device control program as a
12 response telegraphic statement to the instruction issuer.

1 13. An integrated circuit for protocol control as defined
2 in claim 12, wherein, in said control telegraphic statement,
3 said digital money classification field and said device
4 classification field are placed in common in the same field,
5 while specification data for when said field is used as
6 said digital money classification field and specification
7 data for when said field is employed as said device
8 classification field are mutually exclusive values.

1 14. An integrated circuit for protocol control as defined
2 in claim 13, wherein, in said control telegraphic statement,
3 said transaction classification field and said instruction
4 field are placed in common in the same field.

1 15. An integrated circuit for protocol control as defined
2 in claim 10, wherein said control program includes said
3 device control program, said protocol control program and
4 said application program as modules, and further includes a
5 path control program for offering an interface function for
6 an interconnection between these modules, while a peculiar
7 module identifier is given to each of said modules so that
8 said path control program makes the interconnections
9 between said modules by using said module identifier of the
10 connection-requesting module and said module identifier of
11 the connection-accepting module as parameters.

1 16. An integrated circuit for protocol control as defined
2 in claim 10, wherein said peripheral control circuit
3 includes a communication control circuit for controlling a
4 communication with an external unit, and said control
5 program includes said device control program, said protocol
6 control program and said application program as modules,
7 and further includes a path control program for offering an
8 interface function for an interconnection between said
9 modules and a communication control program for controlling
10 said communication control circuit, while, when the
11 connection-requesting module pertains to said external unit,
12 said path control program establishes a connection between
13 the connection-requesting module in said integrated circuit
14 and the connection-accepting module in said external unit
15 through said communication control circuit controlled by
16 said communication control program.

1 17. An integrated circuit for protocol control as defined
2 in claim 16, wherein a peculiar module identifier is given
3 to each of said modules pertaining to said integrated
4 circuit and to each of modules pertaining to said external
5 unit, and a peculiar path identifier is given to said
6 integrated circuit and to said external unit, while said
7 path control program makes an interconnection between said
8 modules by using said module identifier of the connection-
9 requesting module, said module identifier of the

10 connection-accepting module and said path identifiers as
11 parameters.

1 18. An integrated circuit for protocol control as defined
2 in claim 17, further comprising a table for retaining a
3 correspondence between said module identifier and said path
4 identifier indicative of one of said integrated circuit and
5 said external unit to which said module having the same
6 module identifier given pertains, wherein said path control
7 program retrieves said table on the basis of said module
8 identifier of the connection-accepting module to obtain
9 said path identifier corresponding to said module
10 identifier of the connection-accepting module, and, when
11 the obtained path identifier coincides with said path
12 identifier of said integrated circuit, makes a connection
13 between the connection-requesting module and the
14 connection-accepting module in said integrated circuit,
15 while, when the obtained path identifier does not coincide
16 with the path identifier of said integrated circuit, judges
17 that the connection-accepting module pertains to said
18 external unit and makes a connection between the
19 connection-requesting module in said integrated circuit and
20 the connection-accepting module in said external unit
21 through said communication control circuit.

1 19. An integrated circuit for protocol control as defined
2 in claim 18, wherein said correspondence retained in said

3 table is made to accept its setting and change through a
4 telegraphic statement received by said communication
5 control circuit.

1 20. An integrated circuit for protocol control as defined
2 in claim 18, wherein said table is stored in said external
3 storage section serving as said external circuit connected
4 through said interface circuit.

1 21. An integrated circuit for protocol control as defined
2 in claim 16, wherein said external unit is a processing
3 unit having the same function as that of said integrated
4 circuit.

1 22. An integrated circuit for protocol control as defined
2 in claim 17, wherein said external unit is a processing
3 unit having the same function as that of said integrated
4 circuit.

1 23. An integrated circuit for protocol control as defined
2 in claim 18, wherein said external unit is a processing
3 unit having the same function as that of said integrated
4 circuit.

1 24. An integrated circuit for protocol control as defined
2 in claim 19, wherein said external unit is a processing

3 unit having the same function as that of said integrated
4 circuit.

1 25. An integrated circuit for protocol control as defined
2 in claim 20, wherein said external unit is a processing
3 unit having the same function as that of said integrated
4 circuit.

1 26. An integrated circuit for protocol control as defined
2 in claim 16, wherein said external unit is another
3 integrated circuit having the same configuration as that of
4 said integrated circuit.

1 27. An integrated circuit for protocol control as defined
2 in claim 17, wherein said external unit is another
3 integrated circuit having the same configuration as that of
4 said integrated circuit.

1 28. An integrated circuit for protocol control as defined
2 in claim 18, wherein said external unit is another
3 integrated circuit having the same configuration as that of
4 said integrated circuit.

1 29. An integrated circuit for protocol control as defined
2 in claim 19, wherein said external unit is another
3 integrated circuit having the same configuration as that of
4 said integrated circuit.

1 30. An integrated circuit for protocol control as defined
2 in claim 20, wherein said external unit is another
3 integrated circuit having the same configuration as that of
4 said integrated circuit.

1 31. An integrated circuit for protocol control as defined
2 in claim 16, wherein said external unit is a processing
3 unit having an application program for issuing a connection
4 request to said path control program in said integrated
5 circuit for a connection with said module pertaining to
6 said integrated circuit, while, when receiving said
7 connection request from said processing unit through said
8 communication control circuit controlled by said
9 communication control program, said path control program
10 makes a connection between the corresponding module in said
11 integrated circuit and said processing unit.

1 32. An integrated circuit for protocol control as defined
2 in claim 17, wherein said external unit is a processing
3 unit having an application program for issuing a connection
4 request to said path control program in said integrated
5 circuit for a connection with said module pertaining to
6 said integrated circuit, while, when receiving said
7 connection request from said processing unit through said
8 communication control circuit controlled by said
9 communication control program, said path control program

10 makes a connection between the corresponding module in said
11 integrated circuit and said processing unit.

1 33. An integrated circuit for protocol control as defined
2 in claim 18, wherein said external unit is a processing
3 unit having an application program for issuing a connection
4 request to said path control program in said integrated
5 circuit for a connection with said module pertaining to
6 said integrated circuit, while, when receiving said
7 connection request from said processing unit through said
8 communication control circuit controlled by said
9 communication control program, said path control program
10 makes a connection between the corresponding module in said
11 integrated circuit and said processing unit.

1 34. An integrated circuit for protocol control as defined
2 in claim 19, wherein said external unit is a processing
3 unit having an application program for issuing a connection
4 request to said path control program in said integrated
5 circuit for a connection with said module pertaining to
6 said integrated circuit, while, when receiving said
7 connection request from said processing unit through said
8 communication control circuit controlled by said
9 communication control program, said path control program
10 makes a connection between the corresponding module in said
11 integrated circuit and said processing unit.

1 35. An integrated circuit for protocol control as defined
2 in claim 20, wherein said external unit is a processing
3 unit having an application program for issuing a connection
4 request to said path control program in said integrated
5 circuit for a connection with said module pertaining to
6 said integrated circuit, while, when receiving said
7 connection request from said processing unit through said
8 communication control circuit controlled by said
9 communication control program, said path control program
10 makes a connection between the corresponding module in said
11 integrated circuit and said processing unit.

1 36. An integrated circuit for protocol control to be
2 incorporated into an apparatus which conducts data
3 interchange through communication with a portable type
4 medium, said integrated circuit being configured by
5 integrating, on one chip, a storage section for storing a
6 control program prepared for protocols for a plurality of
7 data communications different in mode, a processing section
8 for controlling said plurality of data communications,
9 different in mode, by executing the control program stored
10 in the storage section, and an interface circuit connected
11 to an external circuit including at least one of an
12 external processing section and an external storage section
13 to fulfill an interface function between said external
14 circuit and said processing section.